

What is claimed is:

1. A wireless sensor system which comprises:
 - a plurality of sensors for detecting respective parameters to be detected;
 - a sensor signal transmitter for transmitting wireless sensor signals outputted respectively from the sensors;
 - an electric power receiver for receiving wireless an electric operating power required to drive the sensors and the sensor signal transmitter;
 - a sensor signal receiver for receiving the sensor signals transmitted from the sensor signal transmitter; and
 - an electric power transmitter for transmitting the electric operating power wireless to the electric power receiver.
2. The wireless sensor system as claimed in Claim 1, wherein the sensor signal receiver has a capability of receiving the sensor signals from the respective sensors, which are transmitted by the sensor signal transmitter, and the electric power transmitter is disposed in a sensor signal receiving unit including the sensor signal receiver.
3. The wireless sensor system as claimed in Claim 1, further comprising a plurality of wireless sensor units each including the sensors, the sensor signal transmitter and the electric power receiver.
4. The wireless sensor system as claimed in Claim 1, further comprising a single wireless sensor unit including the sensor, the sensor signal transmitter and the electric power receiver, wherein the plural sensors are provided in this single wireless sensor unit and wherein the sensor signal transmitter is operable to transmit wireless the sensor signals outputted from the plural sensors.
5. The wireless sensor system as claimed in Claim 3, wherein some or all of the plural wireless sensor units each include the plural sensors and wherein the respective sensor signal transmitters in such some or all of the wireless sensor units are operable to transmit wireless the sensor signals outputted from the sensors.

6. The wireless sensor system as claimed in Claim 3, wherein the plural wireless sensor units are mounted on different bearings in a machine plant.

7. The wireless sensor system as claimed in claim 3, wherein at least one of the plural wireless sensor units includes the sensor utilized as a tire pressure sensor for an automotive vehicle or a rotation sensor for a wheel support bearing assembly.

8. A wireless sensor system which comprises:

a plurality of wireless sensor units, each of the wireless sensor units including an electric power receiver having a tuning circuit and a detecting and rectifying circuit for securing an electric operating power from an electromagnetic wave of a predetermined power feeding frequency; a sensor for detecting a parameter to be detected; and a sensor signal transmitter for transmitting a signal outputted from the sensor as a wireless sensor signal in the form of an electromagnetic wave of a natural frequency different from the power feeding frequency; and

a sensor signal receiving unit for supplying wireless the electric operating power to each of those wireless sensor units and for receiving a sensor signal transmitted from each of those wireless sensor units, the sensor signal receiving unit including an electric power transmitter for transmitting wireless the electromagnetic wave of the predetermined power feeding frequency and a sensor signal receiver for receiving the wireless sensor signal of the natural frequency that is transmitted wireless from each of the wireless sensor units.

9. The wireless sensor system as claimed in Claim 8, wherein the sensor signal receiver of the sensor signal receiving unit includes a plurality of receiving circuits each operable to receive a signal of a single frequency corresponding to the assigned natural frequency of the wireless sensor signal transmitted from each of the wireless sensor units.

10. The wireless sensor system as claimed in Claim 8, wherein the sensor signal receiver of the sensor signal receiving unit includes a plurality of tuning

circuits each operable to receive a signal of a single frequency corresponding to the assigned natural frequency of the wireless sensor signal transmitted from each of the wireless sensor units, and a switching detector for switching among outputs of the tuning circuits to select the outputs one at a time on a time sharing basis and for detecting each of the selected outputs.

11. The wireless sensor system as claimed in Claim 8, wherein the sensor signal receiver of the sensor signal receiving unit is capable of varying a receiving frequency in correspondence with the natural frequencies of the wireless sensor signals being transmitted thereto and is capable of receiving the wireless sensor signals by switching among the receiving frequencies to select the receiving frequencies one at a time on a time sharing basis.

12. The wireless sensor system as claimed in Claim 8, wherein the electromagnetic wave for power feeding has a plane of polarization that is different from that of the electromagnetic wave of the wireless sensor signal.

13. The wireless sensor system as claimed in Claim 8, wherein the respective electromagnetic waves of the wireless sensor signals transmitted from the associated wireless sensor units have different planes of polarization.

14. The wireless sensor system as claimed in Claim 8, wherein the plural wireless sensor units are mounted on different bearings in a machine plant.

15. The wireless sensor system as claimed in Claim 8, wherein at least one of the plural wireless sensor units includes the sensor utilized as a tire pressure sensor for an automotive vehicle or a rotation sensor for a wheel support bearing assembly.

16. A bearing assembly equipped with a wireless sensor unit, which comprises:

a plurality of wireless sensor units mounted on a bearing, each of the wireless sensor units including:

a sensor for detecting a parameter to be detected;

a sensor signal transmitter for transmitting wireless a sensor signal outputted from the sensor; and

an electric power receiver for receiving wireless an electric operating power required to drive the sensor and the sensor signal transmitter.

17. A bearing assembly equipped with a wireless sensor unit, which comprises:

one of a plurality of wireless sensor units that is mounted on a bearing;

the plural wireless sensor units each including a sensor for detecting a parameter to be detected; a sensor signal transmitter for transmitting wireless a sensor signal outputted from the sensor; and an electric power receiver for receiving wireless an electric operating power required to drive the sensor and the sensor signal transmitter; and

the plural wireless sensor units being operable to transmit to a common sensor signal receiver the respective sensor signals transmitted from the corresponding sensor signal transmitters and being also operable to receive wireless the electric operating power from a common electric power transmitter through the respective electric power receiver.

18. A bearing assembly equipped with a wireless sensor, which comprises;

a plurality of sensors for detecting respective parameters to be detected;

a sensor signal transmitter for transmitting wireless sensor signals outputted from the respective sensors; and

an electric power receiver for receiving wireless an electric operating power required to drive the sensors and the sensor signal transmitter.

19. The bearing assembly as claimed in Claim 16, wherein at least one of the sensors mounted on the bearing is a rotation sensor including a multipolar magnet, having a plurality of magnetic poles deployed in a direction circumferentially thereof, and a magnetic sensor for detecting the magnetic poles of the multipolar magnet.

20. The bearing assembly as claimed in Claim 17, wherein at least one of the sensors mounted on the bearing is a rotation sensor including a multipolar magnet, having a plurality of magnetic poles deployed in a direction circumferentially thereof, and a magnetic sensor for detecting the magnetic poles of the multipolar magnet.

21. The bearing assembly as claimed in Claim 18, wherein at least one of the sensors mounted on the bearing is a rotation sensor including a multipolar magnet, having a plurality of magnetic poles deployed in a direction circumferentially thereof, and a magnetic sensor for detecting the magnetic poles of the multipolar magnet.

22. The bearing assembly as claimed in Claim 19, wherein the magnetic sensor is a magnetoresistive sensor.

23. The bearing assembly as claimed in Claim 20, wherein the magnetic sensor is a magnetoresistive sensor.

24. The bearing assembly as claimed in Claim 21, wherein the magnetic sensor is a magnetoresistive sensor.

25. The bearing assembly as claimed in Claim 16, wherein the sensor is disposed within a sealed space in the bearing, which is shielded from the outside, and the electric power receiver and the sensor signal transmitter are disposed outside the bearing.

26. The bearing assembly as claimed in Claim 17, wherein the sensor is disposed within a sealed space in the bearing, which is shielded from the outside, and the electric power receiver and the sensor signal transmitter are disposed outside the bearing.

27. The bearing assembly as claimed in Claim 18, wherein the sensor is disposed within a sealed space in the bearing, which is shielded from the outside, and the electric power receiver and the sensor signal transmitter are disposed outside the bearing.

28. A wheel support bearing assembly for rotatably supporting a vehicle wheel relative to a vehicle body structure, the wheel support bearing assembly comprising:

an outer member having a plurality of outer raceways;

an inner member having inner raceways aligned with the outer raceways;

a plurality of rows of rolling elements interposed between the outer raceways and the inner raceways;

one of a plurality of wireless sensor units that is mounted on the wheel support bearing assembly;

the plural wireless sensor units each including a sensor for detecting a parameter to be detected; a sensor signal transmitter for transmitting wireless a sensor signal outputted from the sensor; and an electric power receiver for receiving wireless an electric operating power required to drive the sensor and the sensor signal transmitter;

the plural wireless sensor units being operable to transmit the respective sensor signals to a common sensor signal receiver through the corresponding sensor signal transmitters and is also operable to receive wireless the electric operating power from a common electric power transmitter through the electric power receiver.

29. A wheel support bearing assembly for rotatably supporting a vehicle wheel relative to a vehicle body structure, the wheel support bearing assembly comprising:

an outer member having a plurality of outer raceways;

an inner member having inner raceways aligned with the outer raceways;

a plurality of rows of rolling elements interposed between the outer raceways and the inner raceways;

a plurality of sensors for detecting respective parameters to be detected;

a sensor signal transmitter for transmitting wireless sensor signals outputted from the respective sensors; and

an electric power receiver for receiving wireless an electric operating power required to drive the sensors and the sensor signal transmitter.

30. A wireless sensor system which comprises:

a wheel support bearing assembly as defined in Claim 28;

a sensor signal receiver for receiving the sensor signal transmitted from the sensor signal transmitter in the wheel support bearing assembly; and

an electric power transmitter for transmitting wireless the electric operating power to the electric power receiver;

wherein the sensor signal receiver and the electric power transmitter are disposed in a tire house of the vehicle body structure, where the wheel support bearing assembly is installed, or disposed in a portion of the vehicle body structure, which is more distant from the tire house with respect to the wheel support bearing assembly.

31. A wireless sensor system which comprises:

a wheel support bearing assembly as defined in Claim 29;

a sensor signal receiver for receiving the sensor signal transmitted from the sensor signal transmitter in the wheel support bearing assembly; and

an electric power transmitter for transmitting wireless the electric operating power to the electric power receiver;

wherein the sensor signal receiver and the electric power transmitter are disposed in a tire house of the vehicle body structure, where the wheel support bearing assembly is installed, or disposed in a portion of the vehicle body structure, which is more distant from the tire house with respect to the wheel support bearing assembly.